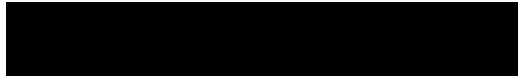


EXHIBIT 2



**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION**

TQ DELTA, LLC,

Plaintiff,

V.

**COMMScope HOLDING
COMPANY, INC., COMMScope
INC., ARRIS INTERNATIONAL
LIMITED, ARRIS GLOBAL LTD.,
ARRIS US HOLDINGS, INC., ARRIS
SOLUTIONS, INC., ARRIS
TECHNOLOGY, INC., and ARRIS
ENTERPRISES, LLC,**

S

Civil Action No. 2:21-cv- 310

JURY TRIAL DEMANDED

Defendants.

ORIGINAL COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff TQ Delta, LLC (“TQ Delta”) and files this Original Complaint for Patent Infringement against Defendants CommScope Holding Company, Inc., CommScope Inc., ARRIS International Limited, ARRIS Global Ltd., ARRIS US Holdings, Inc., ARRIS Solutions, Inc., ARRIS Technology, Inc., and ARRIS Enterprises, LLC (collectively “CommScope”), alleging as follows:

I. INTRODUCTION

1. TQ Delta owns a portfolio of patents relating to digital subscriber line (“DSL”) technologies, including for example very-high-bit-rate digital subscriber line (“VDSL”) technology and Fast Access to Subscriber Terminals technology (“G.fast”). These patents originate from groundbreaking innovations in the DSL field, including innovations that the International Telecommunication Union (“ITU”) adopted in various DSL-related standards.

2. CommScope infringes TQ Delta’s patents. CommScope provides DSL equipment, and TQ Delta has attempted to license its patents to CommScope on a worldwide, non-discriminatory basis and on reasonable terms and conditions. CommScope has refused to obtain such a license or cease its infringement. It has continued to willfully infringe upon TQ Delta’s patents, taking substantial benefits from TQ Delta’s inventions and harming TQ Delta. This case is to redress that harm.

II. NATURE OF THE SUIT

3. This is a claim for patent infringement arising under the patent laws of the United States, Title 35 of the United States Code.

III. THE PARTIES

4. Plaintiff **TQ Delta, LLC** is a is a limited liability company organized and existing under the laws of the State of Delaware and having a principal place of business at 900 S. Capital of Texas Hwy., Suite 150, Austin, Texas 78746.

5. Defendant **CommScope Holding Company, Inc.** is a corporation organized and existing under the laws of the State of Delaware, and can be served through its registered agent, United Agent Group Inc., 3411 Silverside Road Tatnall Building #104, Wilmington, DE 19810.

6. Upon information and belief, Defendant **CommScope Inc.** is a corporation organized and existing under the laws of the State of Delaware, and can be served through its registered agent, United Agent Group Inc., 3411 Silverside Road Tatnall Building #104, Wilmington, DE 19810. Upon information and belief, CommScope Inc. is a wholly owned subsidiary of CommScope Holding Company.

7. Defendants ARRIS International Limited, ARRIS Global Ltd, ARRIS US Holdings, Inc., ARRIS Solutions, Inc., ARRIS Technology, Inc., and ARRIS Enterprises, LLC are collectively referred to as “ARRIS.”

8. CommScope Holding Company, Inc. acquired ARRIS in 2019.¹ On information and belief, CommScope Holding Company, Inc. is the parent corporation of ARRIS.

9. Defendant **ARRIS International Limited** f/k/a Arris International plc is a corporation duly organized and existing under the laws of England and Wales.

10. Defendant **ARRIS Global Ltd.** is a corporation duly organized and existing under the laws of England and Wales. On information and belief, ARRIS Global Ltd is a subsidiary of ARRIS International Limited.

11. Defendant **ARRIS US Holdings, Inc.** is a corporation organized and existing under the laws of the State of Delaware, and can be served through its registered agent, United Agent Group Inc., 3411 Silverside Road, Tatnall Building, #104, Wilmington, DE 19810. On information and belief, ARRIS US Holdings, Inc. is a subsidiary of ARRIS International Limited. CommScope has admitted that “Arris US Holdings, Inc.’s business includes selling products and services throughout the United States, including in this judicial district.”²

12. Defendant **ARRIS Solutions, Inc.** is a corporation organized and existing under the laws of the State of Delaware, and can be served through its registered agent, United Agent Group Inc., 3411 Silverside Road, Tatnall Building, #104, Wilmington, DE 19810. CommScope

¹ See, e.g., *SIPCO, LLC v. CommScope Holding Company, Inc.*, No. 5:20-CV-00168-RWS-CMC, First Amended Complaint, at ¶ 16 (“Upon information and belief, CommScope acquired ARRIS and Ruckus in 2019.”); *SIPCO, LLC v. CommScope Holding Company, Inc.*, No. 5:20-CV-00168-RWS-CMC, Answer to First Amended Complaint (Filed, June 7, 2021) (“SIPCO Answer”), at ¶ 16 (“Admitted.”).

² See, e.g., SIPCO Answer at ¶ 11.

has admitted that “ARRIS Solutions, Inc.’s business includes selling products and services throughout the United States, including in this judicial district.”³ On information and belief, ARRIS Solutions, Inc. is a subsidiary of ARRIS U.S. Holdings, Inc.

13. Defendant **ARRIS Technology, Inc.** is a corporation duly organized and existing under the laws of the State of Delaware and can be served through its registered agent, United Agent Group Inc., 3411 Silverside Road, Tatnall Building, #104, Wilmington, DE 19810. On information and belief, ARRIS Technology, Inc. is a subsidiary of ARRIS Solutions, Inc.

14. Defendant **ARRIS Enterprises LLC** is a corporation organized and existing under the laws of the State of Delaware, and can be served through its registered agent, United Agent Group Inc., 3411 Silverside Road, Tatnall Building, #104, Wilmington, DE 19810. CommScope has admitted that “ARRIS Enterprises LLC’s business includes selling products and services throughout the United States, including in this judicial district.”⁴ On information and belief, ARRIS Enterprises LLC is a subsidiary of ARRIS Technology, Inc.

15. On information and belief, ARRIS maintains regular and established places of business and does business in Texas at its offices at 4516 Seton Center Pkwy, Austin, Texas 78759-5370 and/or 5300 Hollister St., Houston, Texas 77040. On information and belief, ARRIS maintained a regular and established place of business in Plano, Texas prior to its acquisition by CommScope in 2019.⁵ As detailed below, CommScope (including ARRIS) maintains a regular

³ See, e.g., SIPCO Answer, at ¶ 14.

⁴ See, e.g., SIPO Answer, at ¶ 12.

⁵ See, e.g., *Venkee Communications LLC v. Arris Group, Inc.*, No. 2:18-CV-00050, Original Complaint (Dkt. 1), at ¶ 4–10 (alleging a 2018 Plano, Texas location supported by Arris job posting).

and established place of business at 2601 Telecom Parkway, Richardson, Texas 70852, located within this District.

16. Upon information and belief, all Defendants are a single combined “CommScope” company. The online websites for Defendants are combined into a single “CommScope” presence. For example, the ARRIS web domain (www.arris.com) re-directs the public to the CommScope web domain (www.commscope.com).

17. The CommScope web domain further explains that the companies operate as “combined companies” that provide their technologies, solutions, and products, such as by importation, manufacture, sale, and/or offers for sale of their products and services throughout the United States. For example, the CommScope website lists for sale ARRIS-branded DSL product lines that, prior to acquisition of ARRIS, were available from Arris’s website.⁶

18. The CommScope jobs websites (<https://jobs.commscope.com/> and <https://careers.commscope.com/>) appear to handle the job recruitment features for all of CommScope, including ARRIS. In addition, on information and belief, employees of ARRIS became employees of CommScope after the acquisition and work out of CommScope’s Richardson, Texas office located in this district.

IV. JURISDICITON AND VENUE

19. This action is for patent infringement under the patent laws of the United States, 35 U.S.C. § 1 *et seq.*

20. This Court has subject matter jurisdiction over this dispute pursuant to 28 U.S.C. §§ 1331, 1367, 1338(a), and/or 2201.

⁶ Compare e.g., <https://www.commscope.com/product-type/broadband-video-devices/broadband-devices/xdsl-gateways/> with <https://web.archive.org/web/20160301000110/http://www.arris.com/Products/Markets/Telco>.

21. This Court has personal jurisdiction over CommScope, and CommScope has acceded to this Court's jurisdiction in prior patent cases.⁷

22. The Court has personal jurisdiction over CommScope because, among other things, TQ Delta's claims arise in whole or in part from CommScope's conduct in Texas, including making, using, offering to sell and/or selling accused products in Texas, and/or importing accused products into Texas, and/or inducing others to commit acts of patent infringement in Texas. For example, on information and belief, CommScope operates offices at which it does business in Texas at the following locations: 2601 Telecom Parkway, Richardson, Texas 70852; 11312 S. Pipeline Road, Euless, Texas 76040; 4516 Seton Center Pkwy, Austin, Texas 78759-5370; 5300 Hollister St., Houston, Texas 77040; and 4101 W. Military Highway A, McAllen, Texas 78053. CommScope has admitted that it conducts business in Texas.⁸

23. Venue is proper in this District pursuant to 28 U.S.C. §§ 1391 and 1400(b). CommScope has admitted in this Court that it "has a regular and established physical place of business in the Eastern District of Texas."⁹ CommScope maintains a regular and established place

⁷ See, e.g., *SIPCO, LLC v. CommScope Holding Company, Inc.*, No. 5:20-CV-00168-RWS-CMC, Answer to First Amended Complaint, at ¶ 24 ("Defendants, for purposes of this case only, will not challenge personal jurisdiction in the Eastern District of Texas."); See, e.g., *Barkan Wireless IP Holdings, L.P. v. Sprint Corp.*, No. 2:19-CV-00336-JRG, Answer to Amended Complaint, at ¶ 14 ("For the purposes of this action only, CommScope does not challenge the Court's personal jurisdiction over CommScope.").

⁸ See, e.g., *Barkan Wireless IP Holdings, L.P. v. Sprint Corp.*, No. 2:19-CV-00336-JRG, Answer to Amended Complaint, at ¶ 14 ("CommScope admits that it conducts business in Texas.").

⁹ *SIPCO, LLC v. CommScope Holding Company, Inc.*, No. 5:20-CV-00168-RWS-CMC, First Amended Complaint, at ¶ 24 ("Plaintiff is informed and believes, and on that basis alleges, that CommScope has a regular and established physical place of business in the Eastern District of Texas, including at 2601 Telecom Parkway, Richardson Texas 70852 . . ."); SIPCO Answer at ¶ 24 ("Admitted."); see also *Barkan Wireless IP Holdings, L.P. v. Sprint Corp.*, No. 2:19-CV-00336-JRG, Answer to Amended Complaint, at ¶ 16 ("CommScope admits that it has a regular and established place of business in this judicial district at 2601 Telecom Parkway, Richardson, Texas

of business in 2601 Telecom Parkway, Richardson, Texas 70852, located within this District that contains CommScope's employees and/or other individuals CommScope directs or controls.¹⁰ Venue is also proper in this District pursuant to 28 U.S.C § 1391(c)(3) on the basis that ARRIS International Limited and ARRIS Global Ltd are not residents of the United States.

24. On information and belief, CommScope has current and former employees, including engineers, managers, and executives, in this District and/or Texas, including personnel relating to the DSL functionality of the Accused CommScope DSL CPE Products.¹¹

25. On information and belief, CommScope also employed personnel relating to ITU-T standards in Texas and this District.

26. On information and belief, CommScope also has major customers with locations in Texas and this District, including, for example, AT&T.

27. CommScope's commission of acts of infringement in this District, and the presence of an office at which CommScope does business in the Eastern District of Texas, establishes venue over CommScope under 28 U.S.C. § 1400(b).

70852.”).

¹⁰ See, e.g., <https://www.collincad.org/propertysearch?prop=2075393&year=2021> (listing CommScope Inc. as owner of property in Collin County with a tax valuation of \$13,867,489 in 2021).

¹¹ See, e.g., <https://www.linkedin.com/in/joseph-z-yu> (“Firmware development for DSL modems.”); <https://www.linkedin.com/in/stevetcochran> (“I led a distributed team of software engineers continuing the development and support of the Pace DSL residential gateway product. These routers are deployed by AT&T and other service providers to millions of subscriber homes.”); <https://www.linkedin.com/in/wchatila> (regional VP of Sales at CommScope); <https://www.linkedin.com/in/bryce-garrett-8bba71/> (former Director of Sales that “[m]anaged the AT&T Account with responsibility for deployment of all ARRIS Residential Gateways (RGs), Wireless Access Points (WAPs) and home entertainment receivers for U-Verse, Business and Legacy subscribers. Sales were achieved through direct B2B as well as channel partners, VARs and distribution. . . . The ARRIS CPE portfolio includes DSL, VDSL, VDSL2, Bonded VDSL, G.fast and GigaPower Fiber gateways . . .”).

V. BACKGROUND

A. TQ Delta and the DSL Standards

28. TQ Delta is the successor-in-interest in patents from Aware, Inc. (“Aware”). Aware was a world-leading innovator and provider of DSL technologies.

29. This cause of action asserts infringement of the following TQ Delta’s patents, United States Patent Nos. 7,453,881 (“the ’881 Patent”); 7,570,686 (“the ’686 Patent”); 7,844,882 (“the ’882 Patent”); 8,090,008 (“the ’008 Patent”); 8,276,048 (“the ’048 Patent”); 8,462,835 (“the ’835 Patent”); 8,468,411 (“the ’411 Patent”); 8,937,988 (“the ’988 Patent”); 9,094,348 (“the ’348 Patent”); 9,154,354 (“the ’354 Patent”); 9,485,055 (“the ’055 Patent”); 10,567,112 (“the ’112 Patent”); and 10,833,809 (“the ’809 Patent”). (collectively, “the TQ Delta Patents”).

30. The primary inventor of TQ Delta’s DSL patents, Marcos Tzannes, has worked on DSL-related technologies for almost 30 years. Mr. Tzannes was the head of the DSL technology group at Aware, and major semiconductor companies purchased Aware’s chip designs.

31. Mr. Tzannes also had significant involvement in developing industry standards for DSL technology. Mr. Tzannes attended the DSL standard group meetings on behalf of Aware (and continued to do so on behalf of TQ Delta). Mr. Tzannes has been a participant and contributor at ITU meetings in 1997 and, over the years, served as the chair of a number of ITU standards committees. Those include committees relating to DSL, including G.bond. In 2012, the ITU recognized Mr. Tzannes for his contributions on eight different standards.

32. On information and belief, representatives of CommScope also attended these ITU standards meetings at the time Mr. Tzannes attended them.

33. The ITU has adopted a number of industry standards relating to DSL technologies. Those include ITU-T ADSL2/2+, ITU-T VDSL2, ITU-T G.bond, ITU-T G.inp, ITU-T G.vector, and ITU-T G.fast.

B. CommScope's Infringement of the TQ Delta's Patents

34. CommScope infringes the TQ Delta Patents. Its products comply with and implement the DSL standards, including ADSL2/2+, VDSL2, G.bond, G.inp, G.vector, and G.fast. CommScope markets and has marketed its products as complying with these standards. CommScope makes, uses, sells, offers for sale, and/or imports customer premise equipment ("CPE") products, including without limitation gateways, modems, and service managers, that operate in accordance with one or more of the DSL standards ("DSL CPE Products"). The DSL CPE Products operate in accordance with ADSL2/2+, VDSL2, G.bond, G.inp, and/or G.vector.¹² The DSL CPE Products also operate in accordance with G.fast.¹³

35. CommScope provides DSL CPE Products to telephone/broadband carriers and such carriers' subscribers/customers (collectively, "Customers") knowing that its DSL CPE Products will be deployed and used in a DSL network to provide DSL service by operating in accordance with the DSL Standards. CommScope also provides instructions and support (including, for example, providing upgrades, troubleshooting, and warranty support) to its Customers to ensure that its DSL CPE Products operate as intended (*e.g.*, in accordance with the DSL Standards). For

¹² *E.g.*, <https://www.commscope.com/globalassets/digizuite/62029-nvg44x-datasheet.pdf>.

¹³ *E.g.*, https://www.goamt.com/wp-content/uploads/2017/11/FST1305_G.FAST-VDSL2-35B-BRIDGE-MODEM_AMT.pdf.

example, on information and belief, CommScope DSL CPE Products have been deployed in networks for AT&T and Frontier Networks.¹⁴

36. CommScope has known about the TQ Delta Patents and its infringement since prior to filing of this Complaint. TQ Delta contacted ARRIS and offered to engage in licensing discussions on multiple occasions. After CommScope acquired ARRIS, TQ Delta contacted CommScope to offer to engage in licensing discussions. In multiple correspondences with CommScope, TQ Delta identified a number of ARRIS products it believed are covered by TQ Delta's patents. TQ Delta also met with CommScope in Austin, Texas. TQ Delta's attempts to license its patents to CommScope on a worldwide, non-discriminatory basis and on reasonable terms and conditions continued to this year. CommScope still refuses to accept a license TQ Delta's patents on a worldwide, non-discriminatory basis and on reasonable terms and conditions

37. CommScope has known or was willfully blind to its infringement of TQ Delta's patents. As detailed above, TQ Delta has been in near-continuous contact with CommScope for years about its infringement.

38. In addition, CommScope has known or should have known about its infringement based on the publication of the ITU DSL standards and CommScope's involvement with the standards. Since prior to CommScope's infringing conduct alleged herein, the ITU standards have been published with an intellectual-property rights warning that draws attention to the possibility that implementation of the standard may involve the use of a claimed intellectual-property right

¹⁴ See, e.g., <https://www.linkedin.com/in/bryce-garrett-8bba71/> (former Director of Sales that "[m]anaged the AT&T Account with responsibility for deployment of all ARRIS Residential Gateways (RGs), Wireless Access Points (WAPs) and home entertainment receivers for U-Verse, Business and Legacy subscribers. . . . The ARRIS CPE portfolio includes DSL, VDSL, VDSL2, Bonded VDSL, G.fast and GigaPower Fiber gateways"); <https://go.frontier.com/internet/equipment> ("Frontier® Internet works with a variety of routers, like the Arris NVG443B").

and “strongly urge[s]” implementers to consult the ITU’s database regarding applicable intellectual property.¹⁵

39. A basic search of the ITU database would have shown that TQ Delta (or its predecessor-in-interest, Aware) submitted a Patent Statement and Licensing Declarations (“PSLDs”) regarding DSL standards, exemplified below for G.fast (G.9701):

The screenshot shows the ITU database search interface. The search filters are set to: Search: Patent Statement, Received after: [empty], and/or before: [empty], Patent holder/organization: TQ DELTA, LLC, Country: [empty], Licensing option: All, Recommendation: G.9701, Patent country: [empty], Word in patent title: [empty], Patent number: [empty], and Patent application number: [empty]. Below the filters, it says "(*) Wildcard search available, e.g.: "G.6*" or "**Org*"

Below the filters, the search results are displayed. The total found is 3. The page size is 20. The results are shown in a tabular view. The table has the following columns: Statement Id, Recommendation, Patent number, Patent application number, Version of declaration form, License option, Received date, Statement date, and Organization. The results are as follows:

Statement Id	Recommendation	Patent number	Patent application number	Version of declaration form	License option	Received date	Statement date	Organization
G9701-08	G.9701 (ex. G.fast-phy)	None	None	23 April 2012	2	2014-05-19	2014-05-13	TQ DELTA, LLC
G9701_Amd1-02	G.9701 (ex. G.fast-phy)	None	None	26 June 2015	2	2016-02-23	2016-02-22	TQ DELTA, LLC
G9701_Amd2-01	G.9701 (ex. G.fast-phy)	None	None	26 June 2015	2	2016-02-23	2016-02-22	TQ DELTA, LLC

40. Similar searches for TQ Delta (or Aware) would have shown submitted PSLDs for G.inp, G.bond, and VDSL2, among others.

41. The PSLDs identify the standard that a patent holder believes the practice of which requires a license. The ITU PSLDs are publicly available.

¹⁵ See, e.g., https://www.itu.int/rec/dologin_pub.asp?lang=e&id=T-REC-G.9700-201404-S!!PDF-E&type=items (G.fast); https://www.itu.int/rec/dologin_pub.asp?lang=e&id=T-REC-G.998.4-201006-S!!PDF-E&type=items (G.inp).

42. For example, TQ Delta submitted a PSLD in connection with G.fast (G.9701) stating that it “believe[d] that it holds granted and/or pending application for Patents, the use of which would be required to implement [ITU-T G.9701].” TQ Delta and Aware submitted similar PSLDs for G.inp, G.bond, and VDSL2 standards, among others.¹⁶ These PSLDs have been publicly available prior to filing of this Complaint.

43. On information and belief, CommScope is familiar with the PSLD database and the contents of declarations filed with the ITU.

44. Thus, prior to the filing of this Complaint, CommScope had actual knowledge of, and was familiar with, the intellectual-property rights warnings, the ITU procedures and requirements for submissions of PSLDs, and the process of identifying parties who had submitted PSLDs for the DSL standards.

45. Defendants have had actual notice of the TQ Delta Patents and their infringement prior to the filing of this Complaint.

46. Defendants’ infringement, as detailed above, has been willful.

VI. CLAIMS

A. Infringement of the ’881 Patent

47. The allegations of each foregoing paragraph are incorporated by reference as if fully set forth herein and form the basis for the following cause of action against each Defendant.

¹⁶ See, e.g., https://www.itu.int/ITU-T/recommendations/related_ps.aspx?id_prod=10418 (G.998.4); https://www.itu.int/ITU-T/recommendations/related_ps.aspx?id_prod=8548 (G.993.2); https://www.itu.int/ITU-T/recommendations/related_ps.aspx?id_prod=10414 (G.993.5).

48. A true and correct copy of the '881 Patent, entitled "Systems and methods for multi-pair ATM over DSL," and with Marcos Tzannes as the first named inventor, is attached hereto as Exhibit 1.

49. The '881 Patent duly and legally issued on November 18, 2008.

50. TQ Delta is the current owner by assignment of all rights, title, and interest in and under the '881 Patent. TQ Delta has standing to sue for infringement of the '881 Patent.

51. The G.bond (ITU-T G.998.1 and G.998.2) standards specify functionality for a plurality of bonded transceivers, each bonded transceiver utilizing at least one transmission parameter value to reduce a difference in latency between the bonded transceivers, wherein a data rate for a first of the bonded transceivers is different than a data rate for a second of the bonded transceivers (*e.g.*, using forward error correction and/or interleaving parameter values to reduce the difference in latency between the higher and lower speed links).¹⁷

52. CommScope's DSL CPE Products comply with G.bond (ITU-T G.998.1 and G.998.2).¹⁸

53. CommScope has directly infringed and continues to infringe at least claim 17 of the '881 Patent in violation of 35 U.S.C. § 271(a) by, directly or through intermediaries and without TQ Delta's authority, making, using, selling, or offering to sell DSL CPE Products in the United States, or importing said DSL CPE Products into the United States.

54. Further and in the alternative, CommScope has been actively inducing infringement of at least claim 17 of the '881 Patent in violation of 35 U.S.C. § 271(b). CommScope users and

¹⁷ See, *e.g.*, ITU-T G.998.1 at Summary, Table 7.7, Table C.7-7, §§ 1, 11.4.1, K.2.7; ITU-T G.998.2 at Summary, §§ 6, 61.2.2.5.

¹⁸ See, *e.g.*, <https://www.commscope.com/globalassets/digizuite/62029-nvg44x-datasheet.pdf> (disclosing support for ADSL2/2+ bonding and VDSL2 bonding).

customers (*e.g.*, service providers) of DSL CPE Products directly infringed at least claim 17 of the '881 Patent when they used the DSL CPE Products in the ordinary, customary, and intended way to operate within the G.bond (ITU-T G.998.1 and G.998.2) standard. CommScope's inducements included, without limitation and with specific intent to encourage the infringement, knowingly inducing consumers to use the DSL CPE Products within the United States in the ordinary, customary, and intended way by, directly or through intermediaries, supplying said DSL CPE Products to customers within the United States and instructing and encouraging such customers (for example, via distributing the DSL CPE Products to service-provider customers and instructing those service-provider customers to use the products to implement G.bond (ITU-T G.998.1 and G.998.2)) how to use the DSL CPE Products in the ordinary, customary, and intended way, which CommScope knows or should know infringes at least claim 17 of the '881 Patent. CommScope's inducements may further include, without limitation and with specific intent to encourage the infringement, knowingly inducing customers to use the DSL CPE Products within the United States, or knowingly inducing customers to use the DSL CPE Products within the United States, by, directly or through intermediaries, instructing and encouraging such customers to make, use, sell, or offer to sell the DSL CPE Products in the United States, which CommScope knows or should know infringes at least claim 17 of the '881 Patent.

55. Further and in the alternative, CommScope, in violation of 35 U.S.C. § 271(c), has contributorily infringed, and is contributorily infringing, the '881 Patent, by selling DSL CPE Products to customers in the United States for use in practicing at least claim 17 of the '881 Patent, knowing that said products are material to practicing the claimed inventions, are not staple articles or commodities of commerce suitable for substantial non-infringing use, and are especially made or especially adapted for use in an infringement of the '881 Patent. Specifically, CommScope sold

the DSL CPE Products to customers knowing that the products directly infringe the '881 Patent when used for their normal and intended purpose, including by operating in accordance with G.bond (ITU-T G.998.1 and G.998.2). The products are made for the specific purpose of operating according to the DSL Standards and have no substantial non-infringing use.

56. CommScope knew or should have known of the '881 Patent but was willfully blind to the existence of the Patent. CommScope has had actual knowledge of the '881 Patent since at least as early as the filing and service of this Complaint. By the time of the trial of this case, CommScope will have known and intended that its continued actions since receiving such notice would infringe and actively induce and contribute to the infringement of one or more claims of the '881 Patent. CommScope's infringement of the '881 Patent has been willful and deliberate.

B. Infringement of the '686 Patent

57. The allegations of each foregoing paragraph are incorporated by reference as if fully set forth herein and form the basis for the following cause of action against each Defendant.

58. A true and correct copy of the '686 Patent, entitled "Systems and methods for establishing a diagnostic transmission mode and communicating over the same," and with David Krinsky as the first named inventor, is attached hereto as Exhibit 2.

59. The '686 Patent duly and legally issued on August 4, 2009.

60. TQ Delta is the current owner by assignment of all rights, title, and interest in and under the '686 Patent. TQ Delta has standing to sue for infringement of the '686 Patent.

61. The ADSL2/2+ (G.992.3/5) and VDSL2 (ITU-T G.993.2) standards specify functionality for an information storage media comprising instructions that when executed communicate diagnostic information over a communication channel using multicarrier modulation comprising: instructions that when executed direct a transceiver to receive or transmit an initiate

diagnostic mode message; and instructions that when executed transmit from the transceiver a diagnostic message using multicarrier modulation with DMT symbols that are mapped to one bit of the diagnostic message, wherein the diagnostic message comprises a plurality of data variables representing the diagnostic information about the communication channel, and wherein one variable comprises an array representing is frequency domain received idle channel noise information (*e.g.*, loop diagnostic mode procedures).¹⁹

62. CommScope's DSL CPE Products include products that operate in accordance with VDSL2 (ITU-T G.993.2).²⁰

63. CommScope's DSL CPE Products include products that operate in accordance with ASDSL2/2+ (ITU-T G.992.3/5).²¹

64. CommScope has directly infringed and continues to infringe at least claim 36 of the '686 Patent in violation of 35 U.S.C. § 271(a) by, directly or through intermediaries and without TQ Delta's authority, making, using, selling, or offering to sell the DSL CPE Products in the United States, or importing said DSL CPE Products into the United States.

65. Further and in the alternative, CommScope has been actively inducing infringement of at least claim 36 of the '686 Patent in violation of 35 U.S.C. § 271(b). CommScope users and customers (*e.g.*, service providers) of the DSL CPE Products directly infringed at least claim 36 of the '686 Patent when they used the DSL CPE Products in the ordinary, customary, and intended

¹⁹ See, *e.g.*, ITU-T G.992.3/5 §§ 8.8, 8.15 (including, for examples, Tables 8-21, 8-23, 8-42, 8-52, 8-62).; ITU-T G.993.2 §§ 10.4, 11.4, 12.4 (including, for examples, Tables 12-6, 12-10, 12-16, 12-74, 12-71, 12-75).

²⁰ See, *e.g.*, <https://www.commscope.com/globalassets/digizuite/62029-nvg44x-datasheet.pdf> (disclosing support for ITU-T G.993.2).

²¹ See, *e.g.*, <https://www.commscope.com/globalassets/digizuite/62029-nvg44x-datasheet.pdf> (disclosing support for ITU-T G.992.3 and G.992.5).

way to operate within the VDSL2 (ITU-T G.993.2) and/or ADSL2/2+ (ITU-T G.992.3/5) standards. CommScope's inducements included, without limitation and with specific intent to encourage the infringement, knowingly inducing consumers to use the DSL CPE Products within the United States in the ordinary, customary, and intended way by, directly or through intermediaries, supplying said DSL CPE Products to customers within the United States and instructing and encouraging such customers (for example, via distributing the DSL CPE Products to service-provider customers and instructing those service-provider customers to use the products to implement VDSL2 (ITU-T G.993.2) and/or ADSL2/2+ (ITU-T G.992.3/5)) how to use the DSL CPE Products in the ordinary, customary, and intended way, which CommScope knows or should know infringes at least claim 36 of the '686 Patent. CommScope's inducements may further include, without limitation and with specific intent to encourage the infringement, knowingly inducing customers to use the DSL CPE Products within the United States, or knowingly inducing customers to use the DSL CPE Products within the United States, by, directly or through intermediaries, instructing and encouraging such customers to make, use, sell, or offer to sell the DSL CPE Products in the United States, which CommScope knows or should know infringes at least claim 36 of the '686 Patent.

66. Further and in the alternative, CommScope, in violation of 35 U.S.C. § 271(c), has contributorily infringed, and is contributorily infringing, the '686 Patent, by selling the DSL CPE Products to customers in the United States for use in practicing at least claim 36 of the '686 Patent, knowing that said products are material to practicing the claimed inventions, are not staple articles or commodities of commerce suitable for substantial non-infringing use, and are especially made or especially adapted for use in an infringement of the '686 Patent. Specifically, CommScope sold the DSL CPE Products to customers knowing that the products directly infringe the '686 Patent

when used for their normal and intended purpose, including by operating in accordance with VDSL2 (ITU-T G.993.2) and ADSL2/2+ (ITU-T G.992.3/5). The products are made for the specific purpose of operating according to the DSL Standards and have no substantial non-infringing use.

67. CommScope knew or should have known of the '686 Patent but was willfully blind to the existence of the Patent. CommScope has had actual knowledge of the '686 Patent since at least as early as the filing and service of this Complaint. By the time of the trial of this case, CommScope will have known and intended that its continued actions since receiving such notice would infringe and actively induce and contribute to the infringement of one or more claims of the '686 Patent. CommScope's infringement of the '686 Patent has been willful and deliberate.

C. Infringement of the '882 Patent

68. The allegations of each foregoing paragraph are incorporated by reference as if fully set forth herein and form the basis for the following cause of action against each Defendant.

69. A true and correct copy of the '882 Patent, entitled "Resource sharing in a telecommunications environment," and with Marcos Tzannes as the first named inventor, is attached hereto as Exhibit 3.

70. The '882 Patent duly and legally issued on November 30, 2010.

71. TQ Delta is the current owner by assignment of all rights, title, and interest in and under the '882 Patent. TQ Delta has standing to sue for infringement of the '882 Patent.

72. The VDSL2 (ITU-T G.993.2) standard specifies functionality relating to a system that allocates shared memory using a transceiver transmitting or receiving a message during initialization specifying a maximum number of bytes of memory that are available to be allocated to a deinterleaver; determining an amount of memory required by the deinterleaver to deinterleave

a first plurality of Reed Solomon (RS) coded data bytes within a shared memory; allocating a first number of bytes of the shared memory to the deinterleaver to deinterleave a first plurality of Reed Solomon (RS) coded data bytes for transmission at a first data rate, wherein the allocated memory for the deinterleaver does not exceed the maximum number of bytes specified in the message; allocating a second number of bytes of the shared memory to an interleaver to interleave a second plurality of RS coded data bytes received at a second data rate; and deinterleaving the first plurality of RS coded data bytes within the shared memory allocated to the deinterleaver and interleaving the second plurality of RS coded data bytes within the [shared] memory allocated to the interleaver, wherein the shared memory allocated to the deinterleaver is used at the same time as the shared memory allocated to the interleaver (*e.g.*, allocating an amount of shared memory to a deinterleaver based on a `max_delay_octetDS` value received in the O-PMS message).²²

73. CommScope's DSL CPE Products include products that operate in accordance with VDSL2 (ITU-T G.993.2).²³ On information and belief, the DSL CPE Products allocate amounts of shared memory to an interleaver and deinterleaver in the manner described in VDSL 2 (ITU-T G.993.2) above.

74. CommScope has directly infringed and continues to infringe at least claim 13 of the '882 Patent in violation of 35 U.S.C. § 271(a) by, directly or through intermediaries and without TQ Delta's authority, making, using, selling, or offering to sell the DSL CPE Products in the United States, or importing said DSL CPE Products into the United States.

²² See, *e.g.*, ITU-T G.993.2 at §§ 5.1, 6.2.8, 7.1, 9.4, 12.3.5.2.1.3.

²³ See, *e.g.*, <https://www.commscope.com/globalassets/digizuite/62029-nvg44x-datasheet.pdf> (disclosing support for ITU-T G.993.2).

75. Further and in the alternative, CommScope has been actively inducing infringement of at least claim 13 of the '882 Patent in violation of 35 U.S.C. § 271(b). CommScope users and customers (*e.g.*, service providers) of the DSL CPE Products directly infringed at least claim 13 of the '882 Patent when they used the DSL CPE Products in the ordinary, customary, and intended way to operate within the VDSL2 (ITU-T G.993.2) standard. CommScope's inducements included, without limitation and with specific intent to encourage the infringement, knowingly inducing consumers to use the DSL CPE Products within the United States in the ordinary, customary, and intended way by, directly or through intermediaries, supplying said DSL CPE Products to customers within the United States and instructing and encouraging such customers (for example, via distributing the DSL CPE Products to service-provider customers and instructing those service-provider customers to use the products to implement VDSL2 (ITU-T G.993.2)) how to use the DSL CPE Products in the ordinary, customary, and intended way, which CommScope knows or should know infringes at least claim 13 of the '882 Patent. CommScope's inducements may further include, without limitation and with specific intent to encourage the infringement, knowingly inducing customers to use the DSL CPE Products within the United States, or knowingly inducing customers to use the DSL CPE Products within the United States, by, directly or through intermediaries, instructing and encouraging such customers to make, use, sell, or offer to sell the DSL CPE Products in the United States, which CommScope knows or should know infringes at least claim 13 of the '882 Patent.

76. Further and in the alternative, CommScope, in violation of 35 U.S.C. § 271(c), has contributorily infringed, and is contributorily infringing, the '882 Patent, by selling the DSL CPE Products to customers in the United States for use in practicing at least claim 13 of the '882 Patent, knowing that said products are material to practicing the claimed inventions, are not staple articles

or commodities of commerce suitable for substantial non-infringing use, and are especially made or especially adapted for use in an infringement of the '882 Patent. Specifically, CommScope sold the DSL CPE Products to customers knowing that the products directly infringe the '882 Patent when used for their normal and intended purpose, including by operating in accordance with ITU-T VDSL2 (G.993.2). The products are made for the specific purpose of operating according to the DSL Standards and have no substantial non-infringing use.

77. CommScope knew or should have known of the '882 Patent but was willfully blind to the existence of the Patent. CommScope has had actual knowledge of the '882 Patent since at least as early as the filing and service of this Complaint. By the time of the trial of this case, CommScope will have known and intended that its continued actions since receiving such notice would infringe and actively induce and contribute to the infringement of one or more claims of the '882 Patent. CommScope's infringement of the '882 Patent has been willful and deliberate.

D. Infringement of the '008 Patent

78. The allegations of each foregoing paragraph are incorporated by reference as if fully set forth herein and form the basis for the following cause of action against each Defendant.

79. A true and correct copy of the '008 Patent, entitled "System and method for scrambling the phase of the carriers in a multicarrier communications system," and with Marcos Tzannes as the first named inventor, is attached hereto as Exhibit 4.

80. The '008 Patent duly and legally issued on January 3, 2012.

81. TQ Delta is the current owner by assignment of all rights, title, and interest in and under the '008 Patent. TQ Delta has standing to sue for infringement of the '008 Patent.

82. The VDSL2 (ITU-T G.993.2) standard specifies functionality for a multicarrier system including a first transceiver that uses a plurality of carrier signals for modulating a bit

stream, wherein each carrier signal has a phase characteristic associated with the bit stream, the transceiver capable of: associating each carrier signal with a value determined independently of any bit value of the bit stream carried by that respective carrier signal, the value associated with each carrier signal determined using a pseudo-random number generator; computing a phase shift for each carrier signal based on the value associated with that carrier signal; and combining the phase shift computed for each respective carrier signal with the phase characteristic of that carrier signal to substantially scramble the phase characteristics of the plurality of carrier signals, wherein multiple carrier signals corresponding to the scrambled carrier signals are used by the first transceiver to modulate the same bit value (*e.g.*, a quadrant scrambler and message bit mapping that causes the same bit to be transmitted on multiple subcarriers).²⁴

83. The Accused CommScope DSL CPE Products include products that operate in accordance with VDSL2 (ITU-T G.993.2).²⁵

84. CommScope has directly infringed at least claim 14 of the '008 Patent in violation of 35 U.S.C. § 271(a) by, directly or through intermediaries and without TQ Delta's authority, making, using, selling, or offering to sell the DSL CPE Products in the United States, or importing said DSL CPE Products into the United States.

85. Further and in the alternative, CommScope has been actively inducing infringement of at least claim 14 of the '008 Patent in violation of 35 U.S.C. § 271(b). CommScope users and customers (*e.g.*, service providers) of the DSL CPE Products directly infringed at least claim 14 of the '008 Patent when they used the DSL CPE Products in the ordinary, customary, and intended

²⁴ See, *e.g.*, ITU-T G.993.2 at §§ 10.3.3.2.1, 10.4.3, 12.2, 12.3.3.3.1.2, 12.3.3.3.3.2, 12.3.4.3.1.8, 12.3.4.3.2.8, 12.3.5.3.1, 12.3.5.3.2, 12.3.6.2.

²⁵ See, *e.g.*, <https://www.commscope.com/globalassets/digizuite/62029-nvg44x-datasheet.pdf> (disclosing support for ITU-T G.993.2).

way to operate within the VDSL2 (ITU-T G.993.2) standard. CommScope's inducements included, without limitation and with specific intent to encourage the infringement, knowingly inducing consumers to use the DSL CPE Products within the United States in the ordinary, customary, and intended way by, directly or through intermediaries, supplying said DSL CPE Products to customers within the United States and instructing and encouraging such customers (for example, via distributing the DSL CPE Products to service-provider customers and instructing those service-provider customers to use the products to implement VDSL2 (ITU-T G.993.2)) how to use the DSL CPE Products in the ordinary, customary, and intended way, which CommScope knows or should know infringes at least claim 14 of the '008 Patent. CommScope's inducements may further include, without limitation and with specific intent to encourage the infringement, knowingly inducing customers to use the DSL CPE Products within the United States, or knowingly inducing customers to use the DSL CPE Products within the United States, by, directly or through intermediaries, instructing and encouraging such customers to make, use, sell, or offer to sell the CPE Products in the United States, which CommScope knows or should know infringes at least claim 14 of the '008 Patent.

86. Further and in the alternative, CommScope, in violation of 35 U.S.C. § 271(c), has contributorily infringed, and is contributorily infringing, the '008 Patent, by selling the DSL CPE Products standard to customers in the United States for use in practicing at least claim 14 of the '008 Patent, knowing that said products are material to practicing the claimed inventions, are not staple articles or commodities of commerce suitable for substantial non-infringing use, and are especially made or especially adapted for use in an infringement of the '008 Patent. Specifically, CommScope sold the DSL CPE Products to customers knowing that the products directly infringe the '008 Patent when used for their normal and intended purpose, including by operating in

accordance with ITU-T VDSL2 (G.993.2). The products are made for the specific purpose of operating according to the DSL Standards and have no substantial non-infringing use.

87. CommScope knew or should have known of the '008 Patent but was willfully blind to the existence of the Patent. CommScope has had actual knowledge of the '008 Patent since at least as early as the filing and service of this Complaint. By the time of the trial of this case, CommScope will have known and intended that its continued actions since receiving such notice would infringe and actively induce and contribute to the infringement of one or more claims of the '008 Patent. CommScope's infringement of the '008 Patent has been willful and deliberate.

E. Infringement of the '048 Patent

88. The allegations of each foregoing paragraph are incorporated by reference as if fully set forth herein and form the basis for the following cause of action against each Defendant.

89. A true and correct copy of the '048 Patent, entitled "Resource sharing in a telecommunications environment," and with Marcos Tzannes as the first named inventor, is attached hereto as Exhibit 5.

90. The '048 Patent duly and legally issued on September 25, 2012.

91. TQ Delta is the current owner by assignment of all rights, title, and interest in and under the '048 Patent. TQ Delta has standing to sue for infringement of the '048 Patent.

92. The VDSL2 (ITU-T G.993.2) standard specifies functionality relating to a system that allocates shared memory through a transceiver that is capable of: transmitting or receiving a message during initialization specifying a maximum number of bytes of memory that are available to be allocated to an interleaver; determining an amount of memory required by the interleaver to interleave a first plurality of Reed Solomon (RS) coded data bytes within the shared memory; allocating a first number of bytes of the shared memory to the interleaver to interleave the first

plurality of Reed Solomon (RS) coded data bytes for transmission at a first data rate, wherein the allocated memory for the interleaver does not exceed the maximum number of bytes specified in the message; allocating a second number of bytes of the shared memory to a deinterleaver to deinterleave a second plurality of RS coded data bytes received at a second data rate; and interleaving the first plurality of RS coded data bytes within the shared memory allocated to the interleaver and deinterleaving the second plurality of RS coded data bytes within the shared memory allocated to the deinterleaver, wherein the shared memory allocated to the interleaver is used at the same time as the shared memory allocated to the deinterleaver (e.g., allocating an amount of shared memory to an interleaver based on a `max_delay_octetUS` value received in the O-PMS message).²⁶

93. The Accused CommScope DSL CPE Products include products that operate in accordance with VDSL2 (ITU-T G.993.2).²⁷ On information and belief, the DSL CPE Products allocate an amount of shared memory to an interleaver and deinterleaver in the manner described in VDSL 2 (ITU-T G.993.2) above.

94. CommScope has directly infringed and continues to infringe at least claim 1 of the '048 Patent in violation of 35 U.S.C. § 271(a) by, directly or through intermediaries and without TQ Delta's authority, making, using, selling, or offering to sell the DSL CPE Products in the United States, or importing said DSL CPE Products into the United States.

95. Further and in the alternative, CommScope has been actively inducing infringement of at least claim 1 of the '048 Patent in violation of 35 U.S.C. § 271(b). CommScope users and

²⁶ See, e.g., ITU-T G.993.2 at §§ 5.1, 6.2.8, 7.1, 9.4, 12.3.5.2.1.3.

²⁷ See, e.g., <https://www.commscope.com/globalassets/digizuite/62029-nvg44x-datasheet.pdf> (disclosing support for ITU-T G.993.2).

customers (*e.g.*, service providers) of the DSL CPE Products directly infringed at least claim 1 of the '048 Patent when they used the DSL CPE Products in the ordinary, customary, and intended way to operate within the VDSL2 (ITU-T G.993.2) standard. CommScope's inducements included, without limitation and with specific intent to encourage the infringement, knowingly inducing consumers to use the DSL CPE Products within the United States in the ordinary, customary, and intended way by, directly or through intermediaries, supplying said DSL CPE Products to customers within the United States and instructing and encouraging such customers (for example, via distributing the DSL CPE Products to service-provider customers and instructing those service-provider customers to use the products to implement VDSL2 (ITU-T G.993.2)) how to use the DSL CPE Products in the ordinary, customary, and intended way, which CommScope knows or should know infringes at least claim 1 of the '048 Patent. CommScope's inducements may further include, without limitation and with specific intent to encourage the infringement, knowingly inducing customers to use the DSL CPE Products within the United States, or knowingly inducing customers to use the DSL CPE Products within the United States, by, directly or through intermediaries, instructing and encouraging such customers to make, use, sell, or offer to sell the CPE Products in the United States, which CommScope knows or should know infringes at least claim 1 of the '048 Patent.

96. Further and in the alternative, CommScope, in violation of 35 U.S.C. § 271(c), has contributorily infringed, and is contributorily infringing, the '048 Patent, by selling the DSL CPE Products to customers in the United States for use in practicing at least claim 1 of the '048 Patent, knowing that said products are material to practicing the claimed inventions, are not staple articles or commodities of commerce suitable for substantial non-infringing use, and are especially made or especially adapted for use in an infringement of the '048 Patent. Specifically, CommScope sold

the DSL CPE Products to customers knowing that the products directly infringe the '048 Patent when used for their normal and intended purpose, including by operating in accordance with ITU-T VDSL2 (G.993.2). The products are made for the specific purpose of operating according to the DSL Standards and have no substantial non-infringing use.

97. CommScope knew or should have known of the '048 Patent but was willfully blind to the existence of the Patent. CommScope has had actual knowledge of the '048 Patent since at least as early as the filing and service of this Complaint. By the time of the trial of this case, CommScope will have known and intended that its continued actions since receiving such notice would infringe and actively induce and contribute to the infringement of one or more claims of the '048 Patent. CommScope's infringement of the '048 Patent has been willful and deliberate.

F. Infringement of the '835 Patent

98. The allegations of each foregoing paragraph are incorporated by reference as if fully set forth herein and form the basis for the following cause of action against each Defendant.

99. A true and correct copy of the '835 Patent, entitled "Impulse noise management," and with Marcos Tzannes as the first named inventor, is attached hereto as Exhibit 6.

100. The '835 Patent duly and legally issued on June 11, 2013.

101. TQ Delta is the current owner by assignment of all rights, title, and interest in and under the '835 Patent. TQ Delta has standing to sue for infringement of the '835 Patent.

102. The VDSL2 (ITU-T G.993.2) standard specifies functionality for an apparatus configurable to adapt forward error correction and interleaver parameter (FIP) settings during steady-state communication or initialization comprising: a transceiver, including a processor, configurable to: receive a signal using a first FIP setting, receive a flag signal, and switch to using for reception, a second FIP setting following reception of the flag signal, wherein: the first FIP

setting comprises at least one first FIP value, the second FIP setting comprises at least one second FIP value, different than the first FIP value, and the switching occurs on a pre-defined forward error correction codeword boundary following the flag signal. (*e.g.*, changing the interleave depth).²⁸ This functionality is mandatory for using the G.vector (ITU-T G.993.5) standard with VDSL2.

103. The Accused CommScope DSL CPE Products include products that operate in accordance with VDSL2 (ITU-T G.993.2), the including G.vector (ITU-T G.993.5) standard.²⁹

104. CommScope has directly infringed and continues to infringe at least claim 24 of the '835 Patent in violation of 35 U.S.C. § 271(a) by, directly or through intermediaries and without TQ Delta's authority, making, using, selling, or offering to sell DSL CPE Products in the United States, or importing said Accused CommScope DSL CPE Products into the United States.

105. Further and in the alternative, CommScope has been actively inducing infringement of at least claim 24 of the '835 Patent in violation of 35 U.S.C. § 271(b). CommScope users and customers (*e.g.*, service providers) of the DSL CPE Products directly infringed at least claim 24 of the '835 Patent when they used the DSL CPE Products in the ordinary, customary, and intended way to operate within the VDSL2 (ITU-T G.993.2) standard. CommScope's inducements included, without limitation and with specific intent to encourage the infringement, knowingly inducing consumers to use the DSL CPE Products within the United States in the ordinary, customary, and intended way by, directly or through intermediaries, supplying said DSL CPE Products to customers within the United States and instructing and encouraging such customers

²⁸ See, *e.g.*, ITU-T G.993.2 at Figure 13-1, Table 12-57, §§ 3.64, 9.4.1, 13.3; ITU-T G.993.5 at General, § 6.1.

²⁹ See, *e.g.*, <https://www.commscope.com/globalassets/digizuite/62029-nvg44x-datasheet.pdf> (disclosing support for ITU-T G.993.2 and G.993.5 vectoring).

(for example, via distributing the DSL CPE Products to service-provider customers and instructing those service-provider customers to use the products to implement VDSL2 (ITU-T G.993.2)) how to use the DSL CPE Products in the ordinary, customary, and intended way, which CommScope knows or should know infringes at least claim 24 of the '835 Patent. CommScope's inducements may further include, without limitation and with specific intent to encourage the infringement, knowingly inducing customers to use the DSL CPE Products within the United States, or knowingly inducing customers to use the DSL CPE Products within the United States, by, directly or through intermediaries, instructing and encouraging such customers to make, use, sell, or offer to sell the CPE Products in the United States, which CommScope knows or should know infringes at least claim 24 of the '835 Patent.

106. Further and in the alternative, CommScope, in violation of 35 U.S.C. § 271(c), has contributorily infringed, and is contributorily infringing, the '835 Patent, by selling the DSL CPE Products to customers in the United States for use in practicing at least claim 24 of the '835 Patent, knowing that said products are material to practicing the claimed inventions, are not staple articles or commodities of commerce suitable for substantial non-infringing use, and are especially made or especially adapted for use in an infringement of the '835 Patent. Specifically, CommScope sold the DSL CPE Products to customers knowing that the products directly infringe the '835 Patent when used for their normal and intended purpose, including by operating in accordance with ITU-T VDSL2 (G.993.2). The products are made for the specific purpose of operating according to the DSL Standards and have no substantial non-infringing use.

107. CommScope knew or should have known of the '835 Patent but was willfully blind to the existence of the Patent. CommScope has had actual knowledge of the '835 Patent since at least as early as the filing and service of this Complaint. By the time of the trial of this case,

CommScope will have known and intended that its continued actions since receiving such notice would infringe and actively induce and contribute to the infringement of one or more claims of the '835 Patent. CommScope's infringement of the '835 Patent has been willful and deliberate.

G. Infringement of the '411 Patent

108. The allegations of each foregoing paragraph are incorporated by reference as if fully set forth herein and form the basis for the following cause of action against each Defendant.

109. A true and correct copy of the '411 Patent, entitled "Packet retransmission," and with Marcos Tzannes as the first named inventor, is attached hereto as Exhibit 7.

110. The '411 Patent duly and legally issued on June 18, 2013.

111. TQ Delta is the current owner by assignment of all rights, title, and interest in and under the '411 Patent. TQ Delta has standing to sue for infringement of the '411 Patent.

112. The G.inp (ITU-T G.998.4) standard specifies functionality for a transceiver capable of packet retransmission comprising: a receiver portion capable of: receiving a plurality of packets, identifying at least one packet of the plurality of packets as a packet that should be retransmitted and allocating a memory between a retransmission function and an interleaving and/or deinterleaving function wherein the memory is allocated between the retransmission function and the interleaving function and/or the deinterleaving function in accordance with a message received during an initialization of the transceiver and wherein at least a portion of the memory may be allocated between the retransmission function and the interleaving and/or deinterleaving function at any one particular time depending on the message (*e.g.*, allocating amounts of shared memory to an interleaver or deinterleaver function and a retransmission function in accordance information provided in an initialization message).³⁰

³⁰ See, *e.g.*, ITU-T G.998.4, at Summary, §§ 1, 2, 6, 8.2, 8.3, 8.4, Annex D.1.1, C.2.1.3, C.2.1.4.

113. The Accused CommScope DSL CPE Products include products that operate in accordance with G.inp (ITU-T G.998.4).³¹ On information and belief, the DSL CPE Products to allocate memory in the manner described above.

114. CommScope has directly infringed and continues to infringe at least claim 18 of the '411 Patent in violation of 35 U.S.C. § 271(a) by, directly or through intermediaries and without TQ Delta's authority, making, using, selling, or offering to sell the Accused CommScope DSL CPE Products in the United States, or importing said Accused CommScope DSL CPE Products into the United States.

115. Further and in the alternative, CommScope has been actively inducing infringement of at least claim 18 of the '411 Patent in violation of 35 U.S.C. § 271(b). CommScope users and customers (*e.g.*, service providers) of the DSL CPE Products directly infringed at least claim 18 of the '411 Patent when they used the DSL CPE Products in the ordinary, customary, and intended way to operate within the G.inp (ITU-T G.998.4) standard. CommScope's inducements included, without limitation and with specific intent to encourage the infringement, knowingly inducing consumers to use the DSL CPE Products within the United States in the ordinary, customary, and intended way by, directly or through intermediaries, supplying said DSL CPE Products to customers within the United States and instructing and encouraging such customers (for example, via distributing the DSL CPE Products to service-provider customers and instructing those service-provider customers to use the products to implement G.inp (ITU-T G.998.4)) how to use the DSL CPE Products in the ordinary, customary, and intended way, which CommScope knows or should know infringes at least claim 18 of the '411 Patent. CommScope's inducements may

³¹ See, *e.g.*, <https://www.commscope.com/globalassets/digizuite/62029-nvg44x-datasheet.pdf> (disclosing support for ITU-T G.998.4).

further include, without limitation and with specific intent to encourage the infringement, knowingly inducing customers to use the Accused CommScope DSL CPE Products within the United States, or knowingly inducing customers to use the Accused CommScope DSL CPE Products within the United States, by, directly or through intermediaries, instructing and encouraging such customers to make, use, sell, or offer to sell the CPE Products in the United States, which CommScope knows or should know infringes at least claim 18 of the '411 Patent.

116. Further and in the alternative, CommScope, in violation of 35 U.S.C. § 271(c), has contributorily infringed, and is contributorily infringing, the '411 Patent, by selling the DSL CPE Products to customers in the United States for use in practicing at least claim 18 of the '411 Patent, knowing that said products are material to practicing the claimed inventions, are not staple articles or commodities of commerce suitable for substantial non-infringing use, and are especially made or especially adapted for use in an infringement of the '411 Patent. Specifically, CommScope sold the DSL CPE Products to customers knowing that the products directly infringe the '411 Patent when used for their normal and intended purpose, including by operating in accordance with G.inp (ITU-T G.998.4). The products are made for the specific purpose of operating according to the DSL Standards and have no substantial non-infringing use.

117. CommScope knew or should have known of the '411 Patent but was willfully blind to the existence of the Patent. CommScope has had actual knowledge of the '411 Patent since at least as early as the filing and service of this Complaint. By the time of the trial of this case, CommScope will have known and intended that its continued actions since receiving such notice would infringe and actively induce and contribute to the infringement of one or more claims of the '411 Patent. CommScope's infringement of the '411 Patent has been willful and deliberate.

H. Infringement of the '988 Patent

118. The allegations of each foregoing paragraph are incorporated by reference as if fully set forth herein and form the basis for the following cause of action against each Defendant.

119. A true and correct copy of the '988 Patent, entitled "Systems and methods for a multicarrier modulation system with a variable margin" and with Marcos Tzannes as the first named inventor, is attached hereto as Exhibit 8.

120. The '988 Patent duly and legally issued on January 20, 2015.

121. TQ Delta is the current owner by assignment of all rights, title, and interest in and under the '988 Patent. TQ Delta has standing to sue for infringement of the '988 Patent.

122. The G.fast (ITU-T G.9701) standard specifies functionality for an apparatus comprising: a multicarrier communications transceiver operable to demodulate for reception a first plurality of bits from a first carrier using a first Signal to Noise Ratio (SNR) margin and to demodulate for reception a second plurality of bits from a second carrier using a second SNR margin, and to demodulate for reception a third plurality of bits from the first carrier using a third SNR margin, wherein the first SNR margin specifies a first value for an allowable increase in noise without an increase in the bit error rate (BER) associated with the first carrier, wherein the second SNR margin specifies a second value for an allowable increase in noise without an increase in the bit error rate (BER) associated with the second carrier, wherein the third SNR margin specifies a third value for an allowable increase in noise without an increase in the bit error rate (BER) associated with said first carrier, wherein the first SNR margin is different than the second SNR margin, wherein the first SNR margin is different than the third SNR margin, and wherein the first plurality of bits, the second plurality of bits and the third plurality of bits are each different from

one another (*e.g.*, utilizing different signal-to-noise ratio margins for respective carriers associated with different channels).³²

123. The Accused CommScope DSL CPE Products include products that operate in accordance with G.fast (ITU-T G.9701).³³

124. CommScope has directly infringed at least claim 16 of the '988 Patent in violation of 35 U.S.C. § 271(a) by, directly or through intermediaries and without TQ Delta's authority, making, using, selling, or offering to sell the DSL CPE Products in the United States, or importing said DSL CPE Products into the United States.

125. Further and in the alternative, CommScope has been actively inducing infringement of at least claim 16 of the '988 Patent in violation of 35 U.S.C. § 271(b). CommScope users and customers (*e.g.*, service providers) of the DSL CPE Products directly infringed at least claim 16 of the '988 Patent when they used the DSL CPE Products in the ordinary, customary, and intended way to operate within the G.fast (ITU-T G.9701) standard. CommScope's inducements included, without limitation and with specific intent to encourage the infringement, knowingly inducing consumers to use the DSL CPE Products within the United States in the ordinary, customary, and intended way by, directly or through intermediaries, supplying said DSL CPE Products to customers within the United States and instructing and encouraging such customers (for example, via distributing the DSL CPE Products to service-provider customers and instructing those service-provider customers to use the products to implement G.fast (ITU-T G.9701)) how to use the DSL CPE Products in the ordinary, customary, and intended way, which CommScope knows or

³² See, *e.g.*, ITU-T G.9701, at Figures 9-3, 10-3, Table 12-53, 11, §§ 5.3.4, 5.3.7, 7.1.3.2, 7.1.6.1, 9.1, 9.8.3.2, 9.8.3.4, 10.2.1.2, 10.4.3, 12.3.4.2.7, 12.3.4.2.8.

³³ See, *e.g.*, https://www.goamt.com/wp-content/uploads/2017/11/FST1305_G.FAST-VDSL2-35B-BRIDGE-MODEM_AMT.pdf (disclosing support for ITU-T G.9701).

should know infringes at least claim 16 of the '988 Patent. CommScope's inducements may further include, without limitation and with specific intent to encourage the infringement, knowingly inducing customers to use the Accused CommScope DSL CPE Products within the United States, or knowingly inducing customers to use the Accused CommScope DSL CPE Products within the United States, by, directly or through intermediaries, instructing and encouraging such customers to make, use, sell, or offer to sell the CPE Products in the United States, which CommScope knows or should know infringes at least claim 16 of the '988 Patent.

126. Further and in the alternative, CommScope, in violation of 35 U.S.C. § 271(c), has contributorily infringed, and is contributorily infringing, the '988 Patent, by selling the DSL CPE Products to customers in the United States for use in practicing at least claim 16 of the '988 Patent, knowing that said products are material to practicing the claimed inventions, are not staple articles or commodities of commerce suitable for substantial non-infringing use, and are especially made or especially adapted for use in an infringement of the '988 Patent. Specifically, CommScope sold the DSL CPE Products to customers knowing that the products directly infringe the '988 Patent when used for their normal and intended purpose, including by operating in accordance with G.fast (ITU-T G.9701). The products are made for the specific purpose of operating according to the DSL Standards and have no substantial non-infringing use.

127. CommScope knew or should have known of the '988 Patent but was willfully blind to the existence of the Patent. CommScope has had actual knowledge of the '988 Patent since at least as early as the filing and service of this Complaint. By the time of the trial of this case, CommScope will have known and intended that its continued actions since receiving such notice would infringe and actively induce and contribute to the infringement of one or more claims of the '988 Patent. CommScope's infringement of the '988 Patent has been willful and deliberate.

I. Infringement of the '348 Patent

128. The allegations of each foregoing paragraph are incorporated by reference as if fully set forth herein and form the basis for the following cause of action against each Defendant.

129. A true and correct copy of the '348 Patent, entitled "Packet Retransmission" and with Marcos Tzannes as the first named inventor, is attached hereto as Exhibit 9.

130. The '348 Patent duly and legally issued on July 28, 2015.

131. TQ Delta is the current owner by assignment of all rights, title, and interest in and under the '348 Patent. TQ Delta has standing to sue for infringement of the '348 Patent.

132. The G.inp (ITU-T G.998.4) and G.VDSL2 (ITU-T G.993.2) standards specify functionality for an apparatus comprising: a multicarrier transceiver including a processor and memory operable to: receive a packet using a forward error correction decoder and a deinterleaver, wherein the packet comprises a header field and a plurality of PTM-TC codewords, a plurality of ATM cells or a plurality of Reed-Solomon codewords, and wherein the header field comprises a sequence identifier (SID); and transmit a plurality of messages using a forward error correction encoder and without using an interleaver, wherein each message of the plurality of messages is transmitted in a different DMT symbol and wherein at least one message of the plurality of messages includes an acknowledgement (ACK) or a negative acknowledgement (NACK) of the received packet (*e.g.*, using a forward error correction decoder and a deinterleaver as part of packet retransmission processing).³⁴

133. The G.fast (ITU-T G.9701) standard specifies functionality relating to an apparatus comprising: a multicarrier transceiver including a processor and memory operable to: transmit a

³⁴ See, *e.g.*, ITU-T G.993.2, at §§ 10.4.3; ITU-T G.998.4, at Figs. 6-1, 6-2, 6-3, 8-1, 9-1, Table C.6, §§ 3.11, 3.12, 3.13, 3.14, 3.17, 6, 8.1, 8.4, 9.2, 9.3, C.2.2.2 .

packet using a forward error correction encoder and an interleaver, wherein the packet comprises a header field and a plurality of PTM-TC codewords, a plurality of ATM cells or a plurality of Reed-Solomon codewords, and wherein the header field comprises a sequence identifier (SID); and receive a plurality of messages using a forward error correction decoder and without using a deinterleaver, wherein each message of the plurality of messages is received in a different DMT symbol and wherein at least one message of the plurality of messages includes an acknowledgement (ACK) or a negative acknowledgement (NACK) of the transmitted packet (*e.g.*, using a forward error correction encoder and an interleaver as part of packet retransmission processing).³⁵

134. The Accused CommScope DSL CPE Products include products that operate in accordance with G.inp (ITU-T G.998.4).³⁶

135. The Accused CommScope DSL CPE Products include products that operate in accordance with G.fast (ITU-T G.9701).³⁷

136. CommScope has directly infringed and continues to infringe at least claims 1 and 9 of the '348 Patent in violation of 35 U.S.C. § 271(a) by, directly or through intermediaries and without TQ Delta's authority, making, using, selling, or offering to sell the Accused CommScope DSL CPE Products in the United States, or importing said Accused CommScope DSL CPE Products into the United States.

³⁵ See, *e.g.*, ITU-T G.9701, at Tables 9-4, 9-5, 9-8, §§ 8.2, 9.1, 9.3, 9.4, 9.6, 10.4.3.

³⁶ See, *e.g.*, <https://www.commscope.com/globalassets/digizuite/62029-nvg44x-datasheet.pdf> (disclosing support for ITU-T G.998.4).

³⁷ See, *e.g.*, https://www.goamt.com/wp-content/uploads/2017/11/FST1305_G.FAST-VDSL2-35B-BRIDGE-MODEM_AMT.pdf (disclosing support for ITU-T G.9701).

137. Further and in the alternative, CommScope has been actively inducing infringement of at least claim 9 of the '348 Patent in violation of 35 U.S.C. § 271(b). CommScope users and customers (*e.g.*, service providers) of the DSL CPE Products directly infringed at least claim 9 of the '348 Patent when they used the DSL CPE Products in the ordinary, customary, and intended way to operate within the G.inp (ITU-T G.998.4) standard. CommScope's inducements included, without limitation and with specific intent to encourage the infringement, knowingly inducing consumers to use the DSL CPE Products within the United States in the ordinary, customary, and intended way by, directly or through intermediaries, supplying said DSL CPE Products to customers within the United States and instructing and encouraging such customers (for example, via distributing the DSL CPE Products to service-provider customers and instructing those service-provider customers to use the products to implement G.inp (ITU-T G.998.4)) how to use the DSL CPE Products in the ordinary, customary, and intended way, which CommScope knows or should know infringes at least claim 9 of the '348 Patent. CommScope's inducements may further include, without limitation and with specific intent to encourage the infringement, knowingly inducing customers to use the Accused CommScope DSL CPE Products within the United States, or knowingly inducing customers to use the Accused CommScope DSL CPE Products within the United States, by, directly or through intermediaries, instructing and encouraging such customers to make, use, sell, or offer to sell the CPE Products in the United States, which CommScope knows or should know infringes at least claim 9 of the '348 Patent.

138. Further and in the alternative, CommScope has been actively inducing infringement of at least claim 1 of the '348 Patent in violation of 35 U.S.C. § 271(b). CommScope users and customers (*e.g.*, service providers) of the DSL CPE Products directly infringed at least claim 1 of the '348 Patent when they used the DSL CPE Products in the ordinary, customary, and intended

way to operate within the G.fast (ITU-T G.9701) standard. CommScope's inducements included, without limitation and with specific intent to encourage the infringement, knowingly inducing consumers to use the DSL CPE Products within the United States in the ordinary, customary, and intended way by, directly or through intermediaries, supplying said DSL CPE Products to customers within the United States and instructing and encouraging such customers (for example, via distributing the DSL CPE Products to service-provider customers and instructing those service-provider customers to use the products to implement G.fast (ITU-T G.9701)) how to use the DSL CPE Products in the ordinary, customary, and intended way, which CommScope knows or should know infringes at least claim 1 of the '348 Patent. CommScope's inducements may further include, without limitation and with specific intent to encourage the infringement, knowingly inducing customers to use the DSL CPE Products within the United States, or knowingly inducing customers to use the DSL CPE Products within the United States, by, directly or through intermediaries, instructing and encouraging such customers to make, use, sell, or offer to sell the DSL CPE Products in the United States, which CommScope knows or should know infringes at least claim 1 of the '348 Patent.

139. Further and in the alternative, CommScope, in violation of 35 U.S.C. § 271(c), has contributorily infringed, and is contributorily infringing, the '348 Patent, by selling the DSL CPE Products to customers in the United States for use in practicing at least claim 9 of the '348 Patent, knowing that said products are material to practicing the claimed inventions, are not staple articles or commodities of commerce suitable for substantial non-infringing use, and are especially made or especially adapted for use in an infringement of the '348 Patent. Specifically, CommScope sold the DSL CPE Products to customers knowing that the products directly infringe the '348 Patent when used for their normal and intended purpose, including by operating in accordance with G.inp

(ITU-T G.998.4). The products are made for the specific purpose of operating according to the DSL Standards and have no substantial non-infringing use.

140. Further and in the alternative, CommScope, in violation of 35 U.S.C. § 271(c), has contributorily infringed, and is contributorily infringing, the '348 Patent, by selling the DSL CPE Products to customers in the United States for use in practicing at least claim 1 of the '348 Patent, knowing that said products are material to practicing the claimed inventions, are not staple articles or commodities of commerce suitable for substantial non-infringing use, and are especially made or especially adapted for use in an infringement of the '348 Patent. Specifically, CommScope sold the DSL CPE Products to customers knowing that the products directly infringe the '348 Patent when used for their normal and intended purpose, including by operating in accordance with G.fast (ITU-T G.9701). The products are made for the specific purpose of operating according to the DSL Standards and have no substantial non-infringing use.

141. CommScope knew or should have known of the '348 Patent but was willfully blind to the existence of the Patent. CommScope has had actual knowledge of the '348 Patent since at least as early as the filing and service of this Complaint. By the time of the trial of this case, CommScope will have known and intended that its continued actions since receiving such notice would infringe and actively induce and contribute to the infringement of one or more claims of the '348 Patent. CommScope's infringement of the '348 Patent has been willful and deliberate.

J. Infringement of the '354 Patent

142. The allegations of each foregoing paragraph are incorporated by reference as if fully set forth herein and form the basis for the following cause of action against each Defendant.

143. A true and correct copy of the '354 Patent, entitled "System and methods for a multicarrier modulation system with a variable margin" and with Marcos Tzannes as the first named inventor, is attached hereto as Exhibit 10.

144. The '354 Patent duly and legally issued on October 6, 2015.

145. TQ Delta is the current owner by assignment of all rights, title, and interest in and under the '354 Patent. TQ Delta has standing to sue for infringement of the '354 Patent.

146. The G.inp (ITU-T G.998.4) and G.VDSL2 (ITU-T G.993.2) standards specify functionality for a multicarrier communications transceiver operable to: receive a multicarrier symbol comprising a first plurality of carriers and a second plurality of carriers; receive a first plurality of bits on the first plurality of carriers using a first SNR margin; receive a second plurality of bits on the second plurality of carriers using a second SNR margin; wherein the first plurality of carriers is different than the second plurality of carriers, wherein the first SNR margin is different than the second SNR margin, and wherein the first SNR margin provides more robust reception than the second SNR margin (*e.g.*, utilizing different signal-to-noise ratio margins for respective carriers associated with different channels).³⁸

147. The G.fast (ITU-T G.9701) standard specifies functionality relating to a multicarrier communications transceiver operable to: receive a multicarrier symbol comprising a first plurality of carriers and a second plurality of carriers; receive a first plurality of bits on the first plurality of carriers using a first SNR margin; receive a second plurality of bits on the second plurality of carriers using a second SNR margin; wherein the first plurality of carriers is different than the second plurality of carriers, wherein the first SNR margin is different than the second

³⁸ See, *e.g.*, ITU-T G.993.2, at Table 12-49, §§ 9.5.3.1, 9.5.3.2, 10.3.1, 10.4.3, 12.3.5.2.1.1, 12.3.7.1, ; ITU-T G.998.4, at Figs. 6-1, 6-2, 6-3, 8-1, 9-1, Table 12-57, 12-64, 12-65, §§ 9, 10.1, 11.4.1.6.2, 11.4.1.6.4, C.1.2.

SNR margin, and wherein the first SNR margin provides more robust reception than the second SNR margin (*e.g.*, utilizing different signal-to-noise ratio margins for respective carriers associated with different channels).³⁹

148. The Accused CommScope DSL CPE Products include products that operate in accordance with G.inp (ITU-T G.998.4).⁴⁰

149. The Accused CommScope DSL CPE Products include products that operate in accordance with G.fast (ITU-T G.9701).⁴¹

150. CommScope has directly infringed at least claim 10 of the '354 Patent in violation of 35 U.S.C. § 271(a) by, directly or through intermediaries and without TQ Delta's authority, making, using, selling, or offering to sell the Accused CommScope DSL CPE Products in the United States, or importing said Accused CommScope DSL CPE Products into the United States.

151. Further and in the alternative, CommScope has been actively inducing infringement of at least claim 10 of the '354 Patent in violation of 35 U.S.C. § 271(b). CommScope users and customers (*e.g.*, service providers) of the DSL CPE Products directly infringed at least claim 10 of the '354 Patent when they used the DSL CPE Products in the ordinary, customary, and intended way to operate within the G.inp (ITU-T G.998.4) standard. CommScope's inducements included, without limitation and with specific intent to encourage the infringement, knowingly inducing

³⁹ See, *e.g.*, ITU-T G.9701, at Figure 9-3, §§ 9.1, 9.8.3.2, 9.8.3.4, 10.2.1.2, 10.4.3, 12.3.4.2.7, 12.3.4.2.8.

⁴⁰ See, *e.g.*, <https://www.commscope.com/globalassets/digizuite/62029-nvg44x-datasheet.pdf> (disclosing support for ITU-T G.998.4).

⁴¹ See, *e.g.*, https://www.goamt.com/wp-content/uploads/2017/11/FST1305_G.FAST-VDSL2-35B-BRIDGE-MODEM_AMT.pdf (disclosing support for ITU-T G.9701).

consumers to use the DSL CPE Products within the United States in the ordinary, customary, and intended way by, directly or through intermediaries, supplying said DSL CPE Products to customers within the United States and instructing and encouraging such customers (for example, via distributing the DSL CPE Products to service-provider customers and instructing those service-provider customers to use the products to implement G.inp (ITU-T G.998.4)) how to use the DSL CPE Products in the ordinary, customary, and intended way, which CommScope knows or should know infringes at least claim 10 of the '354 Patent. CommScope's inducements may further include, without limitation and with specific intent to encourage the infringement, knowingly inducing customers to use the Accused CommScope DSL CPE Products within the United States, or knowingly inducing customers to use the Accused CommScope DSL CPE Products within the United States, by, directly or through intermediaries, instructing and encouraging such customers to make, use, sell, or offer to sell the CPE Products in the United States, which CommScope knows or should know infringes at least claim 10 of the '354 Patent.

152. Further and in the alternative, CommScope has been actively inducing infringement of at least claim 10 of the '354 Patent in violation of 35 U.S.C. § 271(b). CommScope users and customers (*e.g.*, service providers) of the DSL CPE Products directly infringed at least claim 10 of the '354 Patent when they used the DSL CPE Products in the ordinary, customary, and intended way to operate within the G.fast (ITU-T G.9701) standard. CommScope's inducements included, without limitation and with specific intent to encourage the infringement, knowingly inducing consumers to use the DSL CPE Products within the United States in the ordinary, customary, and intended way by, directly or through intermediaries, supplying said DSL CPE Products to customers within the United States and instructing and encouraging such customers (for example, via distributing the DSL CPE Products to service-provider customers and instructing those service-

provider customers to use to the products to implement G.fast (ITU-T G.9701)) how to use the DSL CPE Products in the ordinary, customary, and intended way, which CommScope knows or should know infringes at least claim 10 of the '354 Patent. CommScope's inducements may further include, without limitation and with specific intent to encourage the infringement, knowingly inducing customers to use the DSL CPE Products within the United States, or knowingly inducing customers to use the DSL CPE Products within the United States, by, directly or through intermediaries, instructing and encouraging such customers to make, use, sell, or offer to sell the DSL CPE Products in the United States, which CommScope knows or should know infringes at least claim 10 of the '354 Patent.

153. Further and in the alternative, CommScope, in violation of 35 U.S.C. § 271(c), has contributorily infringed, and is contributorily infringing, the '354 Patent, by selling the DSL CPE Products to customers in the United States for use in practicing at least claim 10 of the '354 Patent, knowing that said products are material to practicing the claimed inventions, are not staple articles or commodities of commerce suitable for substantial non-infringing use, and are especially made or especially adapted for use in an infringement of the '354 Patent. Specifically, CommScope sold the DSL CPE Products to customers knowing that the products directly infringe the '354 Patent when used for their normal and intended purpose, including by operating in accordance with G.inp (ITU-T G.998.4). The products are made for the specific purpose of operating according to the DSL Standards and have no substantial non-infringing use.

154. Further and in the alternative, CommScope, in violation of 35 U.S.C. § 271(c), has contributorily infringed, and is contributorily infringing, the '354 Patent, by selling the DSL CPE Products to customers in the United States for use in practicing at least claim 10 of the '354 Patent, knowing that said products are material to practicing the claimed inventions, are not staple articles

or commodities of commerce suitable for substantial non-infringing use, and are especially made or especially adapted for use in an infringement of the '354 Patent. Specifically, CommScope sold the DSL CPE Products to customers knowing that the products directly infringe the '354 Patent when used for their normal and intended purpose, including by operating in accordance with G.fast (ITU-T G.9701). The products are made for the specific purpose of operating according to the DSL Standards and have no substantial non-infringing use.

155. CommScope knew or should have known of the '354 Patent but was willfully blind to the existence of the Patent. CommScope has had actual knowledge of the '354 Patent since at least as early as the filing and service of this Complaint. By the time of the trial of this case, CommScope will have known and intended that its continued actions since receiving such notice would infringe and actively induce and contribute to the infringement of one or more claims of the '354 Patent. CommScope's infringement of the '354 Patent has been willful and deliberate.

K. Infringement of the '055 Patent

156. The allegations of each foregoing paragraph are incorporated by reference as if fully set forth herein and form the basis for the following cause of action against each Defendant.

157. A true and correct copy of the '055 Patent, entitled "Packet retransmission and memory sharing" and with Marcos Tzannes as the first named inventor, is attached hereto as Exhibit 11.

158. The '055 Patent duly and legally issued on November 1, 2016.

159. TQ Delta is the current owner by assignment of all rights, title, and interest in and under the '055 Patent. TQ Delta has standing to sue for infringement of the '055 Patent.

160. The G.fast (ITU-T G.9701) standard specifies functionality for a transceiver operable to transmit a first type of packet and to transmit a second type of packet, wherein the first

type of packet is stored in a retransmission buffer after transmission and the second type of packet is not stored in a retransmission buffer after transmission, and wherein the first and second types of packet comprise a header field that indicates whether a transmitted packet is a first type of packet or a second type of packet, and wherein the header field of the first type of packet comprises a sequence identifier (SID) that is incremented after the first type of packet is transmitted and the header field of the second type of packet does not comprise the SID of the first type of packet (*e.g.*, transmitting two types of packets, one stored in a retransmission buffer after transmission and one not stored in a retransmission buffer after transmission, such as processing of data transfer units (DTUs) and dummy DTUs).⁴²

161. The Accused CommScope DSL CPE Products include products that operate in accordance with G.fast (ITU-T G.9701).⁴³

162. CommScope has directly infringed and continues to infringe at least claim 11 of the '055 Patent in violation of 35 U.S.C. § 271(a) by, directly or through intermediaries and without TQ Delta's authority, making, using, selling, or offering to sell the DSL CPE Products in the United States, or importing said DSL CPE Products into the United States.

163. Further and in the alternative, CommScope has been actively inducing infringement of at least claim 11 of the '055 Patent in violation of 35 U.S.C. § 271(b). CommScope users and customers (*e.g.*, service providers) of the DSL CPE Products directly infringed at least claim 11 of the '055 Patent when they used the DSL CPE Products in the ordinary, customary, and intended

⁴² See, *e.g.*, ITU-T G.9701, at Fig. 5-1, §§ 3.2.8, 3.2.11, 8.2, 9; ITU-T G.9711, at §§ 3.2, 8.2, 9.1, 9.8.

⁴³ See, *e.g.*, https://www.goamt.com/wp-content/uploads/2017/11/FST1305_G.FAST-VDSL2-35B-BRIDGE-MODEM_AMT.pdf (disclosing support for ITU-T G.9701).

way to operate within the G.fast (ITU-T G.9701) standard. CommScope's inducements included, without limitation and with specific intent to encourage the infringement, knowingly inducing consumers to use the DSL CPE Products within the United States in the ordinary, customary, and intended way by, directly or through intermediaries, supplying said DSL CPE Products to customers within the United States and instructing and encouraging such customers (for example, via distributing the DSL CPE Products to service-provider customers and instructing those service-provider customers to use the products to implement G.fast (ITU-T G.9701)) how to use the DSL CPE Products in the ordinary, customary, and intended way, which CommScope knows or should know infringes at least claim 11 of the '055 Patent. CommScope's inducements may further include, without limitation and with specific intent to encourage the infringement, knowingly inducing customers to use the Accused CommScope DSL CPE Products within the United States, or knowingly inducing customers to use the Accused CommScope DSL CPE Products within the United States, by, directly or through intermediaries, instructing and encouraging such customers to make, use, sell, or offer to sell the CPE Products in the United States, which CommScope knows or should know infringes at least claim 11 of the '055 Patent.

164. Further and in the alternative, CommScope, in violation of 35 U.S.C. § 271(c), has contributorily infringed, and is contributorily infringing, the '055 Patent, by selling the DSL CPE Products to customers in the United States for use in practicing at least claim 11 of the '055 Patent, knowing that said products are material to practicing the claimed inventions, are not staple articles or commodities of commerce suitable for substantial non-infringing use, and are especially made or especially adapted for use in an infringement of the '055 Patent. Specifically, CommScope sold the DSL CPE Products to customers knowing that the products directly infringe the '055 Patent when used for their normal and intended purpose, including by operating in accordance with G.fast

(ITU-T G.9701). The products are made for the specific purpose of operating according to the DSL Standards and have no substantial non-infringing use.

165. CommScope knew or should have known of the '055 Patent but was willfully blind to the existence of the Patent. CommScope has had actual knowledge of the '055 Patent since at least as early as the filing and service of this Complaint. By the time of the trial of this case, CommScope will have known and intended that its continued actions since receiving such notice would infringe and actively induce and contribute to the infringement of one or more claims of the '055 Patent. CommScope's infringement of the '055 Patent has been willful and deliberate.

L. Infringement of the '112 Patent

166. The allegations of each foregoing paragraph are incorporated by reference as if fully set forth herein and form the basis for the following cause of action against each Defendant.

167. A true and correct copy of the '112 Patent, entitled "Impulse noise management" and with Marcos Tzannes as the first named inventor, is attached hereto as Exhibit 12.

168. The '112 Patent duly and legally issued on February 18, 2020.

169. TQ Delta is the current owner by assignment of all rights, title, and interest in and under the '112 Patent. TQ Delta has standing to sue for infringement of the '112 Patent.

170. The G.fast (ITU-T G.9701) standard specifies functionality for a transceiver comprising: a receiver operable to receiving, during steady-state communication, using a first forward error correction and interleaving parameter (FIP) setting that comprises a forward error correction (FEC) codeword size and a first number of FEC coding parity bytes; and the receiver further operable to switch, during the steady-state communication, to receiving using a second FIP setting that comprises a second FEC codeword size that is different than the first FEC codeword size and a second number of FEC coding parity bytes that is different than the first number of FEC

coding parity bytes, wherein the switching to receiving using the second FEC codeword size and the second number of FEC coding parity bytes is based on a counter reaching a value (*e.g.*, seamless rate adaptation).⁴⁴

171. The Accused CommScope DSL CPE Products include products that operate in accordance with G.fast (ITU-T G.9701).⁴⁵

172. CommScope has directly infringed and continues to infringe at least claim 8 of the '112 Patent in violation of 35 U.S.C. § 271(a) by, directly or through intermediaries and without TQ Delta's authority, making, using, selling, or offering to sell the Accused CommScope DSL CPE Products in the United States, or importing said Accused CommScope DSL CPE Products into the United States.

173. Further and in the alternative, CommScope has been actively inducing infringement of at least claim 8 of the '112 Patent in violation of 35 U.S.C. § 271(b). CommScope users and customers (*e.g.*, service providers) of the DSL CPE Products directly infringed at least claim 8 of the '112 Patent when they used the DSL CPE Products in the ordinary, customary, and intended way to operate within the G.fast (ITU-T G.9701) standard. CommScope's inducements included, without limitation and with specific intent to encourage the infringement, knowingly inducing consumers to use the DSL CPE Products within the United States in the ordinary, customary, and intended way by, directly or through intermediaries, supplying said DSL CPE Products to customers within the United States and instructing and encouraging such customers (for example, via distributing the DSL CPE Products to service-provider customers and instructing those service-

⁴⁴ See, *e.g.*, ITU-T G.9701, at §§ 12.3.4.2, 13.1.1., 13.2.1; ITU-T G.9711, at §§ 9.3, 12.3.4.2, 13.1.

⁴⁵ See, *e.g.*, https://www.goamt.com/wp-content/uploads/2017/11/FST1305_G.FAST-VDSL2-35B-BRIDGE-MODEM_AMT.pdf (disclosing support for ITU-T G.9701).

provider customers to use the products to implement G.fast (ITU-T G.9701)) how to use the DSL CPE Products in the ordinary, customary, and intended way, which CommScope knows or should know infringes at least claim 8 of the '112 Patent. CommScope's inducements may further include, without limitation and with specific intent to encourage the infringement, knowingly inducing customers to use the Accused CommScope DSL CPE Products within the United States, or knowingly inducing customers to use the Accused CommScope DSL CPE Products within the United States, by, directly or through intermediaries, instructing and encouraging such customers to make, use, sell, or offer to sell the CPE Products in the United States, which CommScope knows or should know infringes at least claim 8 of the '112 Patent.

174. Further and in the alternative, CommScope, in violation of 35 U.S.C. § 271(c), has contributorily infringed, and is contributorily infringing, the '112 Patent, by selling the DSL CPE Products to customers in the United States for use in practicing at least claim 8 of the '112 Patent, knowing that said products are material to practicing the claimed inventions, are not staple articles or commodities of commerce suitable for substantial non-infringing use, and are especially made or especially adapted for use in an infringement of the '112 Patent. Specifically, CommScope sold the DSL CPE Products to customers knowing that the products directly infringe the '112 Patent when used for their normal and intended purpose, including by operating in accordance with G.fast (ITU-T G.9701). The products are made for the specific purpose of operating according to the DSL Standards and have no substantial non-infringing use.

175. CommScope knew or should have known of the '112 Patent but was willfully blind to the existence of the Patent. CommScope has had actual knowledge of the '112 Patent since at least as early as the filing and service of this Complaint. By the time of the trial of this case, CommScope will have known and intended that its continued actions since receiving such notice

would infringe and actively induce and contribute to the infringement of one or more claims of the '112 Patent. CommScope's infringement of the '112 Patent has been willful and deliberate.

M. Infringement of the '809 Patent

176. The allegations of each foregoing paragraph are incorporated by reference as if fully set forth herein and form the basis for the following cause of action against each Defendant.

177. A true and correct copy of the '809 Patent, entitled "Techniques for packet and message communication in a multicarrier transceiver environment" and with Marcos Tzannes as the first named inventor, is attached hereto as Exhibit 13.

178. The '809 Patent duly and legally issued on November 10, 2020.

179. TQ Delta is the current owner by assignment of all rights, title, and interest in and under the '809 Patent. TQ Delta has standing to sue for infringement of the '809 Patent.

180. The G.inp (ITU-T G.998.4) and G.VDSL2 (ITU-T G.993.2) standards specify functionality for an apparatus comprising: a multicarrier transceiver including a processor and memory capable of: receiving a packet using forward error correction decoding and deinterleaving, wherein the packet comprises a header field and a plurality of Reed-Solomon codewords, and wherein the header field comprises a sequence identifier (SID); and transmitting a message using forward error correction encoding and without using interleaving, wherein the message is transmitted in a single DMT symbol and wherein the message includes an acknowledgement (ACK) or a negative acknowledgement (NACK) of the received packet (*e.g.*, block deinterleaving of data transmission units (DTUs), for which acknowledgment status is transmitted via the retransmission return channel (RRC)).⁴⁶

⁴⁶ See, *e.g.*, ITU-T G.993.2, at § 10.4; ITU-T G.998.4, at Fig. 6-1, 6-2, Table C.6, §§ 3.11, 3.12, 3.13, 3.14, 3.17, 8.1, 8.4, 9.2 .

181. The G.fast (ITU-T G.9701) standard specifies functionality relating to an apparatus comprising: a multicarrier transceiver including a processor and memory capable of: transmitting a packet using forward error correction encoding and interleaving, wherein the packet comprises a header field and a plurality of Reed-Solomon codewords, and wherein the header field comprises a sequence identifier (SID); and receiving a message using forward error correction decoding and without using deinterleaving, wherein the message is received in a single DMT symbol, and wherein the message includes an acknowledgement (ACK) or a negative acknowledgement (NACK) of the transmitted packet (*e.g.*, block interleaving of data transmission units (DTUs), for which acknowledgment status is received via the retransmission return channel (RRC)).⁴⁷

182. The Accused CommScope DSL CPE Products include products that operate in accordance with G.inp (ITU-T G.998.4).⁴⁸

183. The Accused CommScope DSL CPE Products include products that operate in accordance with G.fast (ITU-T G.9701).⁴⁹

184. CommScope has directly infringed and continues to infringe at least claim 8 of the '809 Patent in violation of 35 U.S.C. § 271(a) by, directly or through intermediaries and without TQ Delta's authority, making, using, selling, or offering to sell the Accused CommScope DSL CPE Products in the United States, or importing said Accused CommScope DSL CPE Products into the United States.

⁴⁷ See, *e.g.*, ITU-T G.9701, at Tables 9-4, 9-5, 9-8, §§ 8.2, 9.1, 9.3, 9.4, 9.6, 10.4.3.

⁴⁸ See, *e.g.*, <https://www.commscope.com/globalassets/digizuite/62029-nvg44x-datasheet.pdf> (disclosing support for ITU-T G.998.4).

⁴⁹ See, *e.g.*, https://www.goamt.com/wp-content/uploads/2017/11/FST1305_G.FAST-VDSL2-35B-BRIDGE-MODEM_AMT.pdf (disclosing support for ITU-T G.9701).

185. CommScope has directly infringed and continues to infringe at least claim 1 of the '809 Patent in violation of 35 U.S.C. § 271(a) by, directly or through intermediaries and without TQ Delta's authority, making, using, selling, or offering to sell the Accused CommScope DSL CPE Products in the United States, or importing said Accused CommScope DSL CPE Products into the United States.

186. Further and in the alternative, CommScope has been actively inducing infringement of at least claim 8 of the '809 Patent in violation of 35 U.S.C. § 271(b). CommScope users and customers (e.g., service providers) of the DSL CPE Products directly infringed at least claim 8 of the '809 Patent when they used the DSL CPE Products in the ordinary, customary, and intended way to operate within the G.inp (ITU-T G.998.4) standard. CommScope's inducements included, without limitation and with specific intent to encourage the infringement, knowingly inducing consumers to use the DSL CPE Products within the United States in the ordinary, customary, and intended way by, directly or through intermediaries, supplying said DSL CPE Products to customers within the United States and instructing and encouraging such customers (for example, via distributing the DSL CPE Products to service-provider customers and instructing those service-provider customers to use the products to implement G.inp (ITU-T G.998.4)) how to use the DSL CPE Products in the ordinary, customary, and intended way, which CommScope knows or should know infringes at least claim 8 of the '809 Patent. CommScope's inducements may further include, without limitation and with specific intent to encourage the infringement, knowingly inducing customers to use the Accused CommScope DSL CPE Products within the United States, or knowingly inducing customers to use the Accused CommScope DSL CPE Products within the United States, by, directly or through intermediaries, instructing and encouraging such customers

to make, use, sell, or offer to sell the CPE Products in the United States, which CommScope knows or should know infringes at least claim 8 of the '809 Patent.

187. Further and in the alternative, CommScope has been actively inducing infringement of at least claim 1 of the '809 Patent in violation of 35 U.S.C. § 271(b). CommScope users and customers (*e.g.*, service providers) of the DSL CPE Products standard directly infringed at least claim 1 of the '809 Patent when they used the DSL CPE Products in the ordinary, customary, and intended way to operate within the G.fast (ITU-T G.9701) standard. CommScope's inducements included, without limitation and with specific intent to encourage the infringement, knowingly inducing consumers to use the DSL CPE Products within the United States in the ordinary, customary, and intended way by, directly or through intermediaries, supplying said DSL CPE Products to customers within the United States and instructing and encouraging such customers (for example, via distributing the DSL CPE Products to service-provider customers and instructing those service-provider customers to use the products to implement G.fast (ITU-T G.9701)) how to use the DSL CPE Products in the ordinary, customary, and intended way, which CommScope knows or should know infringes at least claim 1 of the '809 Patent. CommScope's inducements may further include, without limitation and with specific intent to encourage the infringement, knowingly inducing customers to use the DSL CPE Products within the United States, or knowingly inducing customers to use the DSL CPE Products within the United States, by, directly or through intermediaries, instructing and encouraging such customers to make, use, sell, or offer to sell the DSL CPE Products in the United States, which CommScope knows or should know infringes at least claim 1 of the '809 Patent.

188. Further and in the alternative, CommScope, in violation of 35 U.S.C. § 271(c), has contributorily infringed, and is contributorily infringing, the '809 Patent, by selling the DSL CPE

Products to customers in the United States for use in practicing at least claim 8 of the '809 Patent, knowing that said products are material to practicing the claimed inventions, are not staple articles or commodities of commerce suitable for substantial non-infringing use, and are especially made or especially adapted for use in an infringement of the '809 Patent. Specifically, CommScope sold the DSL CPE Products to customers knowing that the products directly infringe the '809 Patent when used for their normal and intended purpose, including by operating in accordance with G.inp (ITU-T G.998.4). The products are made for the specific purpose of operating according to the DSL Standards and have no substantial non-infringing use.

189. Further and in the alternative, CommScope, in violation of 35 U.S.C. § 271(c), has contributorily infringed, and is contributorily infringing, the '809 Patent, by selling the DSL CPE Products to customers in the United States for use in practicing at least claim 1 of the '809 Patent, knowing that said products are material to practicing the claimed inventions, are not staple articles or commodities of commerce suitable for substantial non-infringing use, and are especially made or especially adapted for use in an infringement of the '809 Patent. Specifically, CommScope sold the DSL CPE Products to customers knowing that the products directly infringe the '809 Patent when used for their normal and intended purpose, including by operating in accordance with G.fast (ITU-T G.9701). The products are made for the specific purpose of operating according to the DSL Standards and have no substantial non-infringing use.

190. CommScope knew or should have known of the '809 Patent but was willfully blind to the existence of the Patent. CommScope has had actual knowledge of the '809 Patent since at least as early as the filing and service of this Complaint. By the time of the trial of this case, CommScope will have known and intended that its continued actions since receiving such notice

191. The allegations of each foregoing paragraph are incorporated by reference as if fully set forth herein.

193. TQ Delta owns patents that are essential to standards adopted by the ITU for various DSL standards.

194. TQ Delta (or its predecessor-in-interest, Aware) submitted PSDs regarding certain DSL standards.

195. These PSLDs expressed that TQ Delta (or its predecessor-in-interest, Aware) was “prepared to grant ... on a worldwide, non-discriminatory basis and on reasonable terms and conditions to make, use and sell implementations....” related to the referenced standard document.

196. Over years of discussion, TQ Delta was prepared to offer and did offer to license, repeatedly, any TQ Delta Patents subject to the PSLDs to CommScope on a worldwide, non-discriminatory basis and on reasonable terms and conditions, including in its July, 2021 offer to CommScope.

197. CommScope refused each of TQ Delta's offers to license these patents.

198. TQ Delta's offers to CommScope were on reasonable terms and conditions.

199. TQ Delta's offers to CommScope were non-discriminatory.

200. TQ Delta's offers to CommScope were on a worldwide basis.

203. CommScope repudiated, prevented performance, waived, forfeited, and/or rejected any rights it had with respect to TQ Delta's PSLDs, including the right to assert it is a third-party beneficiary of the right to a license on the terms set forth in the PSLDs, including under Texas law. For example, CommScope rejected TQ Delta's offers to license the TQ Delta Patents on a worldwide, non-discretionary basis and on reasonable terms and conditions and refused to accept any such terms for a license. CommScope is not a third-party beneficiary of TQ Delta's (or its predecessor-in-interest, Aware's) PSLD submissions that is entitled to a license to TQ Delta's patents on a worldwide, non-discriminatory basis and on reasonable terms and conditions, including under Texas law.

205. CommScope's refusal to license the patents cost TQ Delta years of effort spent in negotiations.

206. TQ Delta and CommScope have adverse legal interests because CommScope continues to use TQ Delta's patented technology without a license, therefore infringes TQ Delta's patents, and has not paid TQ Delta for a license.

207. TQ Delta requests a declaratory judgment that TQ Delta complied with any binding commitment to be prepared to offer a license on terms set forth in the PSLDs or otherwise to license its patents on a worldwide, non-discretionary basis and on reasonable terms and conditions.

208. TQ Delta requests a declaratory judgment that CommScope is not entitled to the any terms in the PSLDs or otherwise entitled to license any of the TQ Delta Patents on a worldwide, non-discretionary basis and on reasonable terms and conditions.

VII. DAMAGES

209. The allegations of each foregoing paragraph are incorporated by reference as if fully set forth herein.

210. For the above-described infringement, TQ Delta has been injured and seeks damages to adequately compensate it for Defendant's infringement of the TQ Delta Patents. Such damages, to be proved at trial, should be no less than the amount of a reasonable royalty under 35 U.S.C. § 284, together with TQ Delta's costs and expenses, pre-judgment and post-judgment interest, and supplemental damages for any continuing post-verdict or post-judgment infringement, with an accounting as needed.

211. As set forth above, Defendant's infringement of the Asserted Patents has been willful, such that TQ Delta seeks treble damages under 35 U.S.C. § 284 as appropriate.

212. Defendant's willful infringement of the TQ Delta Patents renders this case exceptional under 35 U.S.C. § 285, such that TQ Delta seeks all reasonable attorneys' fees and costs incurred in this litigation, together with pre-judgment and post-judgment interest thereon.

VIII. PRAYER FOR RELIEF

TQ Delta respectfully requests the following relief:

- a. A judgment in favor of TQ Delta that Defendant has infringed each Asserted Patent, whether literally or under the doctrine of equivalents, and that such infringement is willful as described herein;
- b. A judgment and order requiring Defendant to pay TQ Delta its damages, costs, expenses, and pre-judgment and post-judgment interest for Defendant's infringement of each Asserted Patent as provided under 35 U.S.C. § 284, including supplemental damages for any continuing post-verdict or post-judgment infringement with an accounting as needed; and
- c. A judgment and order requiring Defendant to pay TQ Delta enhanced damages for willful infringement as provided under 35 U.S.C. § 284;
- d. A judgment and order finding this case exceptional and requiring Defendant to pay TQ Delta its reasonable attorneys' fees and costs incurred in this litigation pursuant to 35 U.S.C. § 285, together with pre-judgment and post-judgment interest thereon;
- e. A judgment that TQ Delta has complied with any binding commitments in its PSLDs in its negotiations with and/or offers to CommScope.
- f. A judgment that CommScope has, through its conduct, repudiated, prevented performance, waived, forfeited, and/or rejected any rights associated with TQ Delta's PSLDs, including the right to assert it is a third-party beneficiary of the right to a license on the terms set forth in the PSLDs; and
- g. Such other and further relief as the Court deems just and proper.

IX. JURY DEMAND

Pursuant to Federal Rule of Civil Procedure 38(b), TQ Delta requests a jury trial of all issues triable of right by a jury.

Dated: August 13, 2021

Respectfully submitted,

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